

A NEW SPECIES OF *DASINEURA* (DIPTERA: CECIDOMYIIDAE) GALLING LEAVES OF *LUPINUS* SPP. (FABACEAE) IN CALIFORNIA

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Abstract. — A new species of gall midge, *Dasineura lupinorum* (Diptera: Cecidomyiidae), is described and illustrated. Larvae cause leaflet galls on *Lupinus* spp. (Fabaceae) in California and Oregon. The new species is distinguished from similar species of *Dasineura*, which also form leaflet galls on legumes, and from *Dasineura lupini* Felt, which forms a bud gall on lupines.

Key Words: Gall midges, lupines, Nearctic

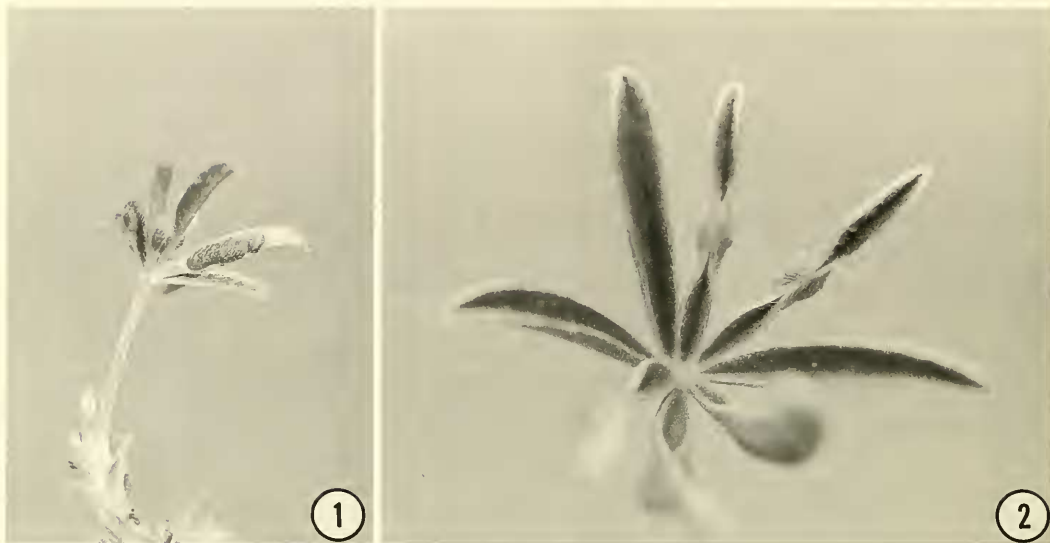
Three kinds of lupine galls formed by cecidomyiids are commonly found along the Pacific coast of the United States (Gagné 1989). One is an enlarged, hairy bud formed by *Dasineura lupini* Felt and another is a stem swelling formed by *Neolasioptera lupini* (Felt). The third kind of gall is a swelling that develops on still folded, elongating leaflets (Figs. 1, 2), but the gall midge has not been described. Osten Sacken (1877) was first to publish a notice of this gall and recognized it as being formed by a cecidomyiid. Felt (1918, 1940) attributed the damage to *Dasineura trifolii* (Loew), which makes a similar leaf fold gall on clovers, *Trifolium* spp. Gagné (1989) assigned the damage to *Dasineura* sp.

During 1991-1992, one of us (DRS) found the leaf galls in Bodega Bay, California on several lupines, *Lupinus arboreus* Sims., *L. chamissonis* Eschs., and *L. variicolor* Steud. Galls were much more abundant on *L. arboreus* than other species. The gall midge is multivoltine on *L. arboreus*, and galls can be found throughout the year. The galls appear to be more abundant in summer, when densities vary upwards to about 80% of leaf-

lets, giving the leaf the appearance of a hand of bananas. Eggs are laid on unopened leaflets of developing buds, when the buds are less than 1 cm in length. Upon hatching, the larvae crawl between the closed halves of the unfolded leaflets in a way similar to larvae of the northern European *Dasineura margineimtorquens* (Bremi) on willow leaves (Larsson and Strong 1992, Strong et al. in press). A gall may contain one to several gregarious larvae. Pupation occurs in the gall. Most galls remain green with succulent, wet interiors while the larvae are feeding. Some galls turn reddish and sclerotic, but the larvae in these are always dead (S. Wainwright, personal communication).

The National Museum of Natural History (USNM) has additional specimens of the galls and gall midges taken in California from San Francisco to Los Angeles. These specimens are from the three hosts listed above and also from *L. albifrons* Benth. and *L. albicaulis* Dougl. ex Hook. RJG has seen the gall on *L. albicaulis* in the vicinity of Corvallis, Oregon.

Dasineura is a large, cosmopolitan genus of some 400 described species, 110 of them



Figs. 1, 2. Leaves of *Lupinus arboreus* infested with *Dasineura lupinorum*. 1, Leaf with galls. 2, Detail of same, showing partially swollen, unfolded leaflets.

from North America. The genus is an artificial, catchall category and contains species of the tribe Oligotrophini that have four palpal segments, toothed tarsal claws, a shortened R_5 wing vein that meets the costa anterior to the wing apex, and the full basic complement of larval papillae for the tribe. The only derived character in that list is the short R_5 vein, which may not be unique in this genus, as a short R_5 occurs also in other tribes of Cecidomyiinae. The new species differs from all other Nearctic *Dasineura* spp. known to us by its bilaterally flattened, fused female cerci. Similarities between the male genitalia of *D. lupinorum* to those of other leaf fold gall makers on papilionaceous Fabaceae, such as *D. trifolii*, show that these species form a natural group within *Dasineura*.

METHODS

Adults were reared from enlarged, green, galled leaves that had been picked from the plant and placed in glass bottles. All specimens were killed and stored in 70% ethanol. Some larvae and adults were mounted for microscopic study in Canada balsam,

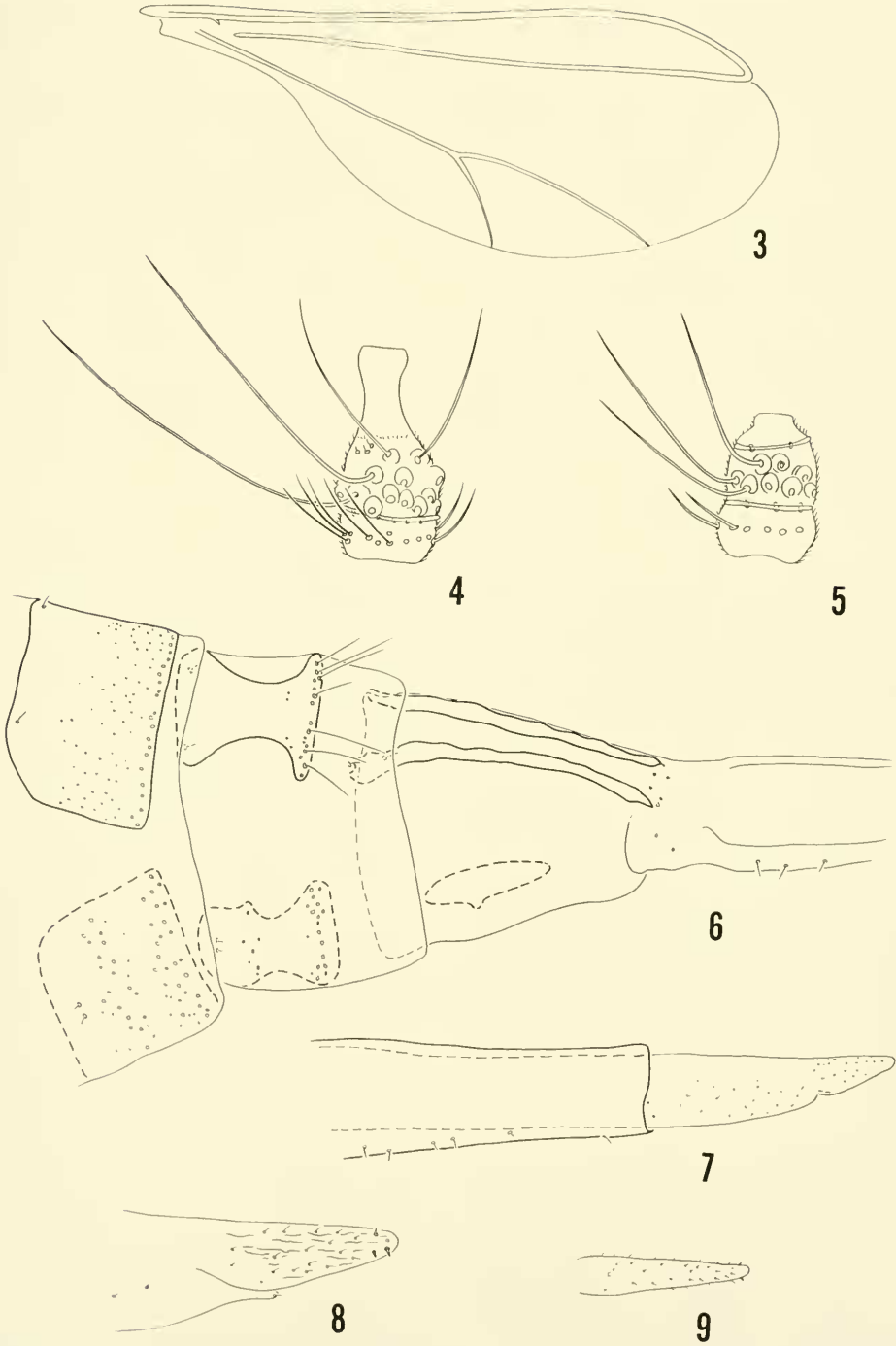
using the method outlined in Gagné (1989). In the descriptions that follow, anatomical terminology of the adult stage follows usage in McAlpine et al. (1981) and that of the larval stage follows that in Gagné (1989). The new species is to be attributed to RJG.

Dasineura lupinorum Gagné, NEW SPECIES

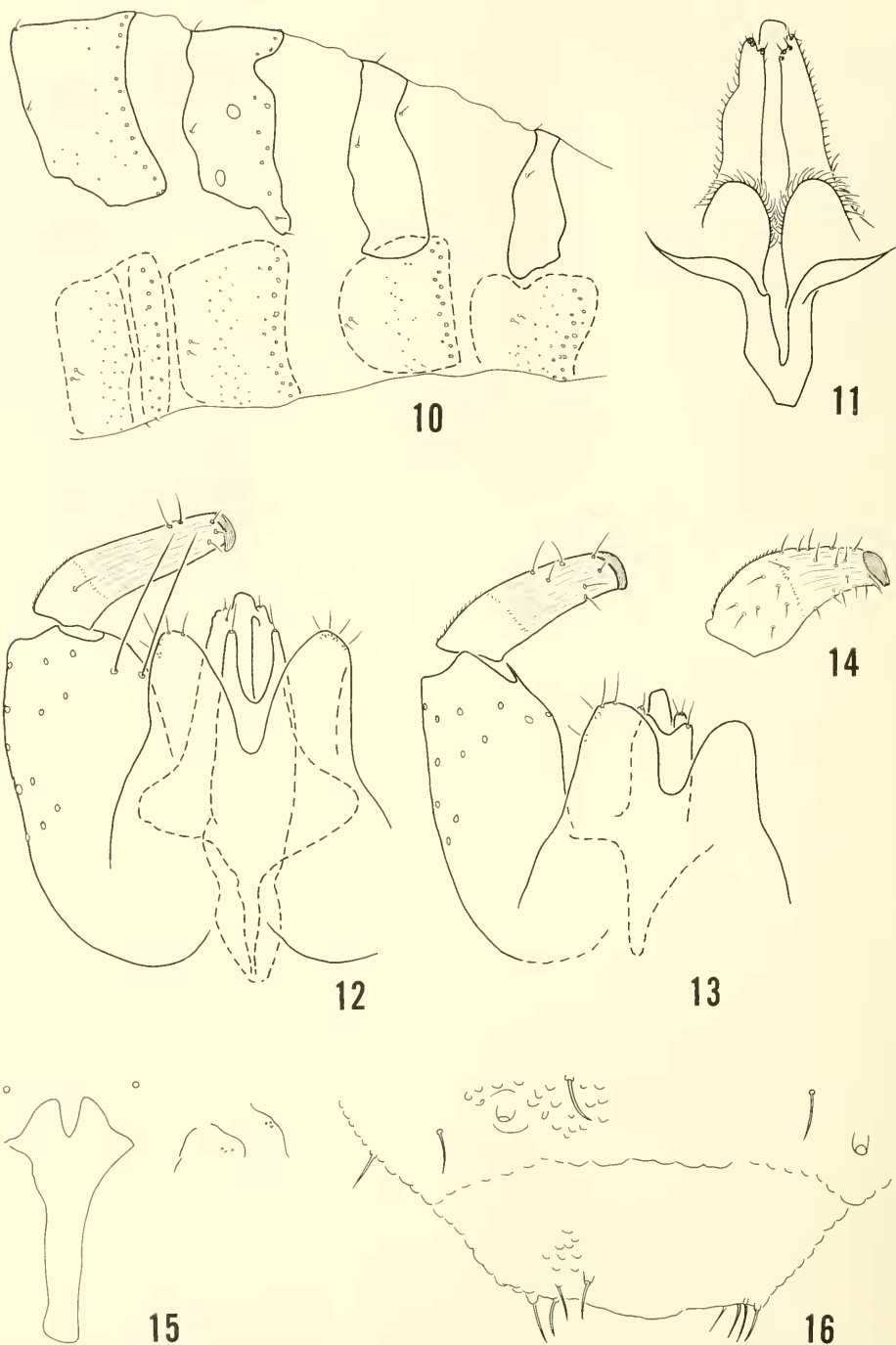
Adult.—Wing length: male, 1.3–1.8 mm ($n = 10$); female 1.3–1.7 mm ($n = 10$).

Head: Eyes 3–4 facets long at vertex; facets circular, separated by $\frac{1}{2}$ to 1 facet diameter on top half of eye, closely adjacent on bottom half of eye. Vertex of occiput broadly rounded. Frons with setae and scales. Labella hemispherical, each with 6–8 setae. Palpus 4 segmented. Male antenna with 13–14 flagellomeres, the third as in Fig. 4. Female antenna with 12–14 flagellomeres, the third as in Fig. 5.

Thorax: Scutum with 2 lateral and 2 dorsocentral rows of mixed setae and scales. Scutellum with a group of setae on each side. Mesanepisternum covered with scales on dorsal half. Mesepimeron with 6–10 setae. Wing (Fig. 3) with R_5 joining C anterior to



Figs. 3-9. *Dasineura lupinorum*. 3, Wing. 4, Male third flagellomere, dorsal. 5, Female third flagellomere, dorsal. 6, Female sixth through eighth abdominal segments, dorsolateral. 7, Ovipositor, lateral. 8, Detail of fused cerci and hypoproct, lateral. 9, Detail of fused cerci, dorsal.



Figs. 10-16. 10-12, *Dasineura lupinorum*. 10, Male fifth through eighth abdominal segments, dorsolateral. 13, Claspettes and aedeagus, dorsal. 14, Male genitalia, dorsal. 13, *Dasineura maritima* male genitalia, dorsal. 14, *Dasineura lupini* gonostylus, dorsal. 15, 16, *Dasineura lupinorum*. 15, Larval spatula and associated papillae. 16, Larval terminal segments, dorsal.

wing apex. Claws toothed, empodia as long as claws.

Male abdomen (Figs. 10–12): First through fifth tergites entire, rectangular, with single, uninterrupted, posterior row of setae and scattered setae anteriorly; sixth tergite with anterior setal row interrupted mesally, seventh and eighth tergites reduced in size, bare except for anterior pair of trichoid setae. Cerci broadly rounded, with several setae along posterior margin; hypoproct with two long narrow lobes, each with distal seta; claspettes elongate, attenuate, with dorso-basal lobes; gonocoxites cylindrical, unlobed; gonostyli cylindrical, weakly and evenly tapered from base to apex, setulose at base, striate beyond to short distal tooth.

Female abdomen (Figs. 6–9): First through sixth tergites rectangular, with single row of posterior setae, anterior pair of trichoid setae, and almost completely covered with scales elsewhere; seventh tergite much narrower, concave laterally, with posterior row of setae and scales, anterior pair of trichoid setae, and 0 to several scales elsewhere; eighth tergite much longer and divided into two elongate sclerites; distal half of ovipositor elongate, moderately flattened bilaterally; cerci fused, greatly flattened bilaterally; hypoproct narrow, longer than wide.

Third instar.—Integument rugose. Spatula (Fig. 15) clove shaped. All papillae basic for supertribe present (Gagné 1989); terminal papillae (Fig. 16) with 8 setae of equal length.

Holotype.—Male, emerged VII-1992 from larva from folded leaves of *Lupinus arboreus*, collected VII-1992, Bodega Marine Reserve, Bodega Bay, California, D. R. Strong, deposited in the National Museum of Natural History, Washington, D.C. Paratypes (all in USNM except 2 ♂ and 2 ♀ in California Academy of Sciences, San Francisco, California): 3 ♂, 5 ♀, and 10 larvae, same pertinent data as for holotype; 4 ♂, 4 ♀, same pertinent data as holotype except collected and reared V-1992, ♂, ♀, same data except from *L. variicolor*; 4 ♂, 3 ♀, same data

except from *L. chamissonis*. Other material (all in alcohol in USNM): Additional adults and larvae from *L. arboreus* and adults from *L. chamissonis*, all from Bodega Bay, VII-1992, D. R. Strong. Adults, all reared in spring, 1947, from lupines in California by A. E. Pritchard: from *L. albifrons*, "Sharp Pk."; from *L. arboreus*, Davenport, Santa Cruz Co., Montara and San Gregorio, San Mateo Co., and Stinson Beach, Marin Co.; and from *L. variicolor*, Montara, San Mateo Co. Galls from *L. albifrons*, Fresno, California, no date, C. C. Jenney. Galls from *L. albifrons*, Lone Mt., San Francisco, California, IV-1876, C. R. Osten Sacken.

Etymology.—The specific name *lupinorum* is a noun in the genitive plural, meaning "of lupines."

Remarks.—The characteristic gonostyli of this species have a shape similar to those of *Dasineura maritima* Felt (Fig. 13), known from leaf folds on *Lathyrus maritimus* (L.) Bigel. in Massachusetts, and of *Dasineura trifolii* (Loew), known from leaf folds on *Trifolium pratense* L. and *Trifolium repens* L. in Europe and the United States. Other *Dasineura* species have the gonostyli much more bulbous on the basal half, as does *Dasineura lupini* Felt (Fig. 14), reared from bud galls of *Lupinus arboreus* in California (see Russo 1979 for notes on the biology of this species). Larvae of all three species from leaf folds are similar also. The ovipositor of *D. lupinorum* is distinctive for its bilaterally flattened ovipositor; that of the other two leaf rollers is cylindrical.

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